Effectiveness of Rat Bone Marrow Stem Cell Therapy to Rattus novergicus by Teratogenic Model of Particulate Matter on Expression of Kappa Beta (NFk(l) Nuclear Factor on Placenta

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Effectiveness of Rat Bone Marrow Stem Cell Therapy to *Rattus novergicus* by Teratogenic Model of Particulate Matter on Expression of Kappa Beta (NFkβ) Nuclear Factor on Placenta

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Key words: expression of NF-kβ, Rat Bone Marrow Stem Cell, teratogenic, particulate matter

INTRODUCTION

Air pollution in several cities in East Java has exceeded the threshold set by the government. One of the pollutant components that pollute the air is particulate matter (PM) [1]. PM component effects health because it is cytotoxic and teratogenic. Particulate Matter can cause inflammation on the respiratory and cardiovascular systems, and it can pass through the placental barrier so that it can affect fetal development [3].

Exposure to Particulate Matter (PM) can affect prenatal maternal health through a variety of mechanisms, including increased Reactive Oxygen Species (ROS), which stimulates macrophages to secrete cytokines TNF-α and NFkB which will further accelerate the process of apoptosis in placenta [2].

Currently, interest in stem cells for the treatment of various diseases is increasing. The MarrowStem Bone Cell is utilized for therapy because it has a self-renewing properties, so that therapy need not be repeated. In an teratogenic case, Bone Marrow Stem Cell administration can reduce the inflammation, apoptosis and congenital abnormalities [4].

Therefore, the utilization of Bone Marrow Stem Cell for therapy in the teratogenic case requires a biomolecular repoduction study to reveal the mechanisms of disorders in placentation during pregnancy as a basis of proving the study scientifically. This study used rats as an animal model of teratogenic particulate matter merely for ethical consideration and smooth execution of the study.

MATERIALS AND METHODS

This study used 2 groups. The control group (K) had 15 pregnant rats exposed to carbon black powder with a dose of 532 mg / m3 on per-inhalation of 4 hours / day during pregnancy of 7-18 days without Rat Bone Marrow Stem Cell therapy. The treatment group (P) had 15 pregnant rats exposed to carbon black powder with a dose of 532 mg / m3 on a per-inhalation of 4 hours / day during pregnancy of 7-18 days with Rat Bone Marrow Stem Cell therapy with a dosage of 106 / head. The intravenous injections were made on the tails. On day 19 the termination and placental tissue examination to see NFkB expression by immunohistochemistry were done.

RESULTS AND DISCUSSION

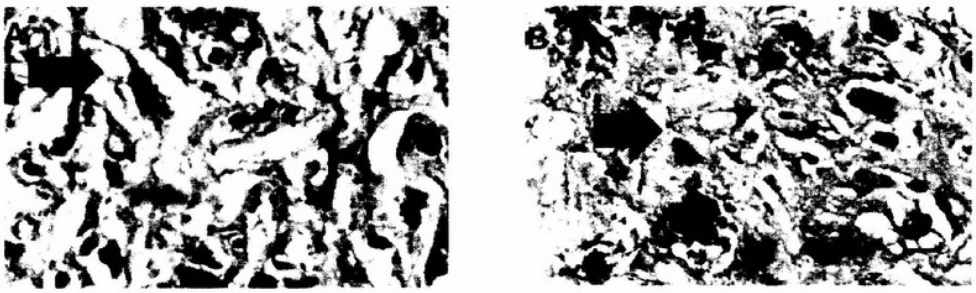
Each sample was semi-qualtitatively assessed using modified Remmele method The assessment result of the expression of Nfκβ in placenta using modified method of semi-qualtitative Remmele Index Scale (IRS) then tested using Kruskal Wallis was observably very different, then continued with Mann-Whitney test for the two treatments which can be seen in table 1.

Table 1 shows that there is a significant result on the treatment group (expossed to Carbon Black and given Stem Cell therapy) compared to the control group (expossed to Carbon Black). It shows that *Rat Bone Marrow Stem Cell* can decrease placental Nf-κβ expression [5].

Table 1. Score of placental Nf-κβ expression

Immunohitochemistry	Group	Comparing Group	Significance
Nf-κβ	Control	Treatment	0.001**

**Significnce p<0.01



Picture 1. Picture A dan B show Nfκβ expression of placental tropoblast cells. Control group (picture A) shows negative expression (arrow). Treatment group (picture B) shows possitive expression shown by brownish color. (Coloring Imunohisto-chemistry,1000x)

CONCLUSION

The result of rat bone marrow stem cell therapy administration on pregnant white rats expossed to particulate matter showed a decrease in placental NF-κB expression.

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PAGE 1

PAGE 2